

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

3D SYSTEMS, INC.,

Plaintiff,

-vs-

Case No. 05-74891  
HON. AVERN COHN

ENVISIONTEC, INC., et al,

Defendants.

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**MEMORANDUM AND ORDER GRANTING PLAINTIFF'S RENEWED MOTION FOR  
JUDGMENT AS A MATTER OF LAW AND DENYING DEFENDANTS' RENEWED  
MOTION FOR JUDGMENT AS A MATTER OF LAW**

**I. INTRODUCTION**

This is a patent case. It involves twelve patents directed to the art of stereolithography. Four of the twelve patents and one claim from each were designated for trial, (Docs. 52, 59), as follows:

- Claim 11 of U.S. Patent No. 5,630,981 (the '981 Patent), Method for Production of Three-Dimensional Objects by Stereolithography;
- Claim 2 of U.S. Patent No. 5,651,934 (the '934 Patent), Recoating of Stereolithographic Layers;
- Claim 81 of U.S. Patent No. 5,902,537 (the '537 Patent), Rapid Recoating of Three Dimensional Objects Formed on a Cross-Sectional Basis; and
- Claim 35 of U.S. Patent No. 4,999,143 (the '143 Patent), Method and Apparatus for Production of Three-Dimensional Objects by Stereolithography.

Generally, 3D Systems claims that defendants Envisiontec, Inc., Envisiontec GMBH; and SIBCO, Inc. (collectively, Envisiontec) infringed the four described patents through the manufacture and sale of their Perfactory and Vanquish machines, both of which are used

to make three dimensional objects based on a computer model. Three of the patents were tried to a jury.<sup>1</sup> After a seven day trial, a jury found claim 11 of the '981 Patent not infringed, claim 2 of the '934 Patent infringed, and claim 81 of the '537 Patent not infringed. (Doc. 275).<sup>2</sup>

Now before the Court are the parties' renewed motions for judgments as a matter of law (JMOL): 3D Systems asks the Court to set aside the jury's verdict of no infringement on claim 11 of the '981 Patent and to find infringement (Doc. 283); Envisiontec asks the Court to set aside the jury's verdict of infringement on claim 2 of the '934 Patent and to find no infringement (Doc. 284). Neither party challenges the jury verdict of no infringement on claim 81 of the '537 Patent.

For the reasons that follow, 3D System's motion will be granted and Envisiontec's motion will be denied.

## II. THE MOTIONS

Regarding claim 11 of the '981 Patent, 3D Systems essentially argues that based on the evidence at trial reasonable minds do not support the jury's verdict of no infringement because claim 11 requires the Perfactory and Vanquish machines (collectively, accused machines) to provide data representing adjacent cross sectional layers of the three dimensional object to be formed, not that the data be in a layer format.

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<sup>1</sup>The Court granted summary judgment on the fourth patent, the '143 Patent, in favor of Envisiontec. (Doc. 167).

<sup>2</sup>The background of the case is reflected in the: Memorandum and Order Adopting Report and Recommendations of Special Master (Doc. 167); Amended Pretrial Order (Doc. 178); and Amendment to Amended Pretrial Order. (Doc. 195).

Envisiontec generally responds that the jury's verdict is supported by the evidence because claim 11 requires the accused machines to provide data in the form of cross sectional layers.

As to claim 2 of the '934 Patent, Envisiontec argues that the evidence at trial was not sufficient to support the jury's finding of infringement because the accused Vanquish machine does not provide a smooth and level coating of building material due to its continuous downward movement and operation 200 microns beneath the surface of the uncured material. Further, Envisiontec argues that claim 2 is not infringed because the accused Vanquish machine's winged blade does not contact the building material to smooth. Rather, it contacts the material to cool. 3D Systems responds that Envisiontec's arguments have no merit because based on the evidence at trial reasonable minds would conclude that the accused Vanquish machine smooths the building material and the winged blade contacts it.

### **III. STANDARD OF REVIEW**

The law on a motion for a judgment as a matter of law is well known. As stated by the Court in a prior case:

Fed. R. Civ. P. 50 provides the following standard for granting judgment as a matter of law:

If during a trial by jury a party has been fully heard on an issue and there is no legally sufficient evidentiary basis for a reasonable jury to find for that party on that issue, the court may determine the issue against that party and may grant a motion for judgment as a matter of law against that party with respect to a claim or defense that cannot under the controlling law be maintained or defeated without a favorable finding on that issue.

Fed. R. Civ. P. 50(a)(1). In addition, when a party makes a renewed motion

after a verdict has been returned, the court may: "(A) allow the judgment to stand, (B) order a new trial, or (C) direct entry of judgment as a matter of law[.]" Fed. R. Civ. P. 50(b)(1). The inquiry for resolving a Rule 50 motion judgment as a matter of law is the same as the inquiry for resolving a motion for summary judgment under Fed. R. Civ. P. 56. White v. Burlington N. & Santa Fe Ry. Co., 364 F.3d 789, 794 (5th Cir. 2004) (en banc) (citing Reeves v. Sanderson Plumbing Prods., Inc., 530 U.S. 133, 150 (2000)). That is, "[j]udgment as a matter of law is appropriate when viewing the evidence in the light most favorable to the non-moving party, there is not genuine issue of material fact for the jury, and reasonable minds could come to but one conclusion in favor of the moving party." Tisdale v. Fed. Express Corp., 415 F.3d 516, 527 (6th Cir. 2005) (internal quotation omitted).

Sundance, Inc. v. DeMonte Fabricating, Ltd., No. 02-73543, 2006 WL 2708541, at \*2 (E.D. Mich. Sept. 20, 2006).

## IV. ANALYSIS

### A. Claim 11 of the '981 Patent

#### 1. Relevant Background

##### a. Abstract

Claim 11 of the '981 Patent involves a method for production of three dimensional objects by stereolithography. The Abstract best describes the coverage of claim 11:

A system for generating three dimensional objects by creating a cross sectional pattern of the object to be formed at a selected surface of a fluid medium capable of altering its physical state in response to appropriate synergistic stimulation by impinging radiation, particle bombardment or chemical reaction, successive adjacent laminae, representing corresponding successive adjacent cross sections of the object, being automatically formed and integrated together to provide a step-wise laminar buildup of the desired object, whereby a three-dimensional object is formed and drawn from a substantially planar surface of the fluid medium during the forming process.

(Doc. 98, p. 2).

##### b. Claim Construction

At issue in the trial was the coverage of two of claim 11's limitations. The

claim language and construction of both are as follows:<sup>3</sup>

Claim 11, Limitation 5	Claim Construction
providing data representing the three-dimensional object to be formed which was generated on CAD system;	This limitation should be interpreted as though it included the qualifying phrase “adjacent cross sectional layers of” after the word “representing.” This construction comports with the disclosed invention of the ‘981 patent. This construction also provides an antecedent basis for Limitation 12 of claim 11 which sets forth the step of “forming and adhering successive cross sectional layers. . . . by exposing the polymer to said light in response to said data.” In the circumstances, the data representing the three-dimensional object referred to in this step must be data that is representative of adjacent cross section layers of the object.
Claim 11, Limitation 12	Claim Construction
by exposing said [medium] photopolymer to said [prescribed radiation] light in response to said data.	The “said data” referred to this last step of claim 11 is the data of Limitation 5, namely, the data which is representative of adjacent cross sectional layers of the object.

(Doc. 91, pp. 16, 18).

### c. Trial Evidence

The pertinent trial testimony is summarized as follows.

#### I. Envisiontec Witnesses

- Ali El-Siblani (El-Siblani) - Founder and Chief Executive Officer of each defendant company. He described the accused machines’ software program, the Perfactory Suite, as a program that: receives data from the CAD system’s customer model, adjusts it to account for shrinkage and

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<sup>3</sup>For the purpose of the present motion, the two limitations, claim limitation 5 and claim limitation 12, will hereinafter be referred to collectively as “claim 11.”

heat generation, and sends it to one of the accused machines to build the object layers – a process he says results in variances between the original and final data sets. He also described that the data can be stored in bitmaps at various locations on the computer and not in separate layer files.

- Volker Schillen (Schillen) (by video) - Former Chief Technology Officer (CTO) of defendant Envisiontec GmbH. He described that the software program does not use two dimensional layer data. Rather, he testified that the software uses a voxelization process to generate individual data points, where each point represents an approximation of volume of a 3D object at a certain point. He further testified that the program does not use sliced or layer data.
- Sebastian Magda (Magda) (expert) - Director of Science and Engineering, CorTech Labs, Inc., San Diego, CA. He explained the software program. Particularly, he described that it electronically places a solid CAD model into a build object, which is then subdivided into individual voxels, i.e., data points. The data is then analyzed, adjusted, and stored in bitmaps, which are later copied one by one during the build process. He also testified that each numeric data value does not arrive simultaneously to form the object layer. Because the data is modified by the software program, he testified it is not the same as that generated by the original CAD model.

## ii. 3D Systems Witnesses

- Brent Stucker (Stucker) (expert) - Professor, Department Chair of Computer- Aided Engineering, University of Louisville. He described that the data is used to tell the accused machines what pattern to build by aggregating a series of numbers between 0 and 255. He agreed with Magda and El-Siblani's description of the voxelization process and with the fact that the data is sent to the build process independently.
- Charles Hull (Hull) - Cofounder, Executive Vice President and Chief Technology Officer (CTO) at 3D Systems. He described the first step in a stereolithography flow chart to reflect the process of data generating layers.

## d. Jury Instructions

The jury was instructed as follows.

The '981 Patent relates to stereolithography generally, and more particularly to a process of building parts and prototypes from computer-aided design, or CAD, files representing the object to be built. The CAD files are converted

into data representing adjacent layers of the object to be built, and the part is then created by exposing the building material to light in response to the data.

As to the '981 Patent's data element, 3D Systems' position is that in the Perfactory and Vanquish machines, the data (0-255) that represents the brightness intensity values, plus any additional data such as exposure data and data used to correct for material shrinkage, optics problems, etc., collectively control the mirrors and the amount of light applied to the building material to cure each successive layer. Thus, all of this data is collectively "data representing the adjacent cross-sectional layers of the three dimensional object to be formed which was generated on a CAD system." Therefore, the two claim elements at issue in the '981 Patent are met by both the Perfactory and Vanquish machines.

Envisiontec's position is that the Perfactory and Vanquish machines do not provide data representing adjacent cross-sectional layers of the three-dimensional object to be formed which was generated on a CAD system or use data representing adjacent cross-sectional layers of the object to be formed during curing. Instead, the software modifies the CAD model to produce voids or remove volume in the final part to create a part that is different than the three-dimensional object that was generated on a CAD system. The software also modifies the object by using a voxelization process to calculate individual defined data points known as voxels. The locations of the voxels in the storage bitmaps are unique to each voxel and each voxel is independent of any other voxel on the same or a different bitmap. The software also utilizes curing depth, shrinkage compensation, and exposure time information of each individual voxel, which is different from any other voxel, to modify the CAD model to produce voids or volume removal inside the finished part in response to the voxel information. The storage bitmaps have nothing to do with solidification or curing of the modified three-dimensional object. Each mirror on the digital light projector (DLP) receives an individual defined voxel data point at a different time from any other voxel data point to project a uniquely assigned light intensity to a specific location in the photopolymer.

#### e. Jury Verdict

At the end of trial, the jury found that the accused machines did not infringe claim 11 in answering "no" to two verdict form questions:

1. Whether, as required by claim 11, Envisiontec's Perfactory and Vanquish machines provide data representing adjacent cross-sectional layers of the three dimensional object to be formed which was generated on a CAD

system.

2. Whether, as required by claim 11, Envisiontec's Perfactory and Vanquish machines expose the medium (photopolymer) to said prescribed radiation (light) in response to the data representing adjacent cross-sectional layers of the three-dimensional object to be formed.

(Doc. 275; see also Amended Pretrial Order, Doc. 178, and Amendment to Amended Pretrial Order, Doc. 195, which set forth the issues for trial).

## 2. The Parties' Positions

a.

3D Systems argues that reasonable minds can only come to only one conclusion about claim 11: the accused machines do infringe because they provide data representing cross sectional layers of the 3D object to be formed. The crux of 3D Systems' assertion is that claim 11 requires the accused machines to provide data representative of cross sectional layers of the three dimensional object, not unadjusted data, or data in a layer format. In support, 3D Systems relies on the trial testimony of El-Siblani and Stucker, who testified that the Perfactory Suite software program adjusts data values received from the CAD system's customer model in order for the data to be compatible with the voxelization process, which ultimately builds the desired object part. 3D Systems says that it does not dispute that data values are adjusted by the software program. Rather, it says that regardless of the data adjustments and the fact that the object is formed using the voxelization process, i.e., using individual data points rather than data in a layer format, there is still infringement because at the end of the build process an object is formed in cross sectional layers using the data, which is all that claim 11 requires.

b.

Envisiontec, on the other hand, argues that claim 11 requires data in the form of a layer, unadjusted from that which is sent to the accused machines from the CAD system. In other words, because the accused machines build objects using data generated through the voxelization process, and not in a layer format, there is no infringement. In support, Envisiontec relies on the trial testimony of Schillen, El-Siblani, and Magda, who testified that the accused machines generate voxel data to build a desired object part. Envisiontec also cites the testimony of Hull and Stucker. Hull described a stereolithography flowchart as demonstrating data generating layers of a three dimensional object, and Stucker testified that he did not review the software program's source code and that he agreed with Magda and El-Siblani's description of the voxelization process and of the data's format when it is used to build the object part. In sum, Envisiontec says that because the evidence presented at trial demonstrates that the data generated by the software is not in the form of cross sectional layers, there can be no infringement. Finally, Envisiontec says that a jury instruction given by the Court during the trial supports its argument that the data must be in the form of cross sectional layers.

c.

In essence, the decision comes down to whether claim 11 requires data in a format that represents a cross sectional layer when it is used by the accused machines to build a three dimensional object, or data that is in a cross sectional layer format when it is used by the accused machines to build a three dimensional object. The former is the correct conclusion as follows.

First, claim 11's construction, adopted by the Court, states, "the data representing

the three-dimensional object referred to in this step must be data that is representative of adjacent cross sectional layers of the object.” (Doc. 91, p. 16). Standing alone, the claim construction supports the argument that the data be representative of the layers of the three dimensional object to be formed, rather than literally in a layer format.

Next, during the Markman phase, Envisiontec’s narrowed construction of the terms “data” and “representing” was never sought or adopted. (Doc. 98). Likewise, narrower constructions will not be read into the claim at this stage of the case. Moreover, even if the Court were to consider doing so, Envisiontec fails to proffer sufficient evidence in support of its proposed construction that claim 11 requires the data to be in a layer format.

Finally, Envisiontec does not dispute the special master’s finding, adopted by the Court, that the accused machines’ ultimately form a desired object part in cross sectional layers. Logically, then, simply by virtue of the fact that the accused machines are able to accurately build the object part in cross sectional layers using the data, the data must be found to represent the adjacent cross sectional layers of the object to be formed. Envisiontec’s argument to the contrary is not persuasive.

As to Envisiontec’s jury instruction argument, taken in context, the cited instruction was given to the jury during El-Siblani’s trial testimony in a preliminary attempt to focus their attention on the data as opposed to how the machine operates. (Doc. 285-2, “And I’m going to give you an instruction at the end which will further elaborate on this, but we’re not talking at this point about how the machine operates. We’re talking [] at this point [about] the input into the computer, the software program”). Accordingly, the assertion that it proves Envisiontec’s argument that data must be in the form of cross sectional layers fails.

For the reasons stated above, 3D Systems is correct that reasonable minds could have only reached a finding of infringement as to claim 11. Thus, the jury's verdict of no infringement will be set aside.

## **B. Claim 2 of the '934 Patent**

### 1. Relevant Background

#### a. Abstract

Claim 2 of the '934 Patent involves recoating of stereolithographic layers. The Abstract best describes the coverage of claim 2:

Apparatus and method for stereolithographically forming a three-dimensional object includes a vessel for holding a building material and a smoothing member for forming a uniform coating over a previously formed layer of the object. The smoothing member has a plurality of blades. The smoothing member is swept over a previously formed layer of the object, in at least two directions. Different clearances between the lower surface of the smoothing member and the upper surface of the previously formed layer are used to provide a uniform coating for a subsequent layer over the previously formed layer. The sweeping velocity of the smoothing member can be varied. Retractable needles are attached to the smoothing member for adjusting a blade gap between a lower surface of the smoothing member and the surface of the building material.

(Doc. 98, pp. 3-4).

#### b. Claim Construction

At issue in the trial was the coverage of two of claim 2's limitations. The claim language and construction of both are as follows.<sup>4</sup>

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<sup>4</sup>For the purpose of the present motion, the two limitations, claim limitation 6 and claim limitation 9, will hereinafter be referred to collectively as "claim 2."

Claim 2, Limitation 6	Claim Construction
b) forming a uniform coating of desired layer thickness over the previously formed layer.	The term “uniform” means a smooth, level coating. After the word “coating,” the phrase “of uncured building material” could be added for greater clarity of meaning. Envisiontec’s interpretation incorrectly adds structural and process limitations into this limitation.
Claim 2, Limitation 9	Claim Construction
said [smoothing element] winged blade having a plurality of substantially separate members on a lower surface thereof for contacting the building material.	[Reference to Limitation 7, which states:] The step of sweeping means that a device having a winged blade with sides that are at angles with respect to the surface of the material is moved across the upper surface of uncured building material to sweep away excess curable liquid thereby create a uniform coating of desired or predetermined thickness over the previously cured layer of building material.

(Doc. 91, pp. 12 - 13).

c. Trial Evidence

The pertinent trial evidence is summarized as follows.

i. Envisiontec Witnesses

- Alexander Shkolnik (Shkolnik) - Chief Technology Officer of Envisiontec. He demonstrated the operation of the accused Vanquish machine, particularly, that during a part build the platform moves continuously down. He also described that the Vanquish’s cooling blade traverses the material tank at periodic intervals to cool down the material as heat is generated.
- Mr. Ali El-Siblani (El-Siblani) - Founder and Chief Executive Officer of each defendant company. He testified that the Vanquish build platform moves continuously down during a build operation and that the curing of the part takes place at least 200 microns below the surface of the material. He also testified that because the build platform is continuously moving down, a smooth surface is not created, nor is a smooth surface necessary due to the material being cured multiple times before the cooling blade traverses the material tank.

ii. Envisiontec Exhibit

- Inspection of Vanquish Machine (Video) - Illustrates the building of an object part by a Vanquish Machine.

iii. 3D Systems Witness

- Dr. Brent Stucker (Stucker) (expert) - Professor, Department Chair of Computer-Aided Engineering, University of Louisville. He agreed that the build platform is continuously moving down during the build process and that the build material is cured multiple times before the cooling blade traverses the material tank.

d. Jury Instructions

The jury was instructed as follows.

The '934 Patent relates to a "winged blade" used in a stereolithography machine. The winged blade has a plurality of separate members (namely more than one) on a lower surface, which contact the building material and form a uniform, i.e., a smooth, level coating of the building material over previously formed layers of the object.

e. Jury Verdict

At the end of trial, the jury found that Envisiontec's accused Vanquish machine did not infringe claim 2 in answering "yes" to two verdict form questions as follows:

1. Whether, as required by claim 11, Envisiontec's Vanquish machine operates to form a smooth level coating of uncured building material of desired layer thickness over the previously formed layer.
2. Whether, as required by claim 11, the winged blade of the Vanquish machine which has a plurality of substantially separate members on a lower surface thereof for contacting the building material.

(Doc. 275).

2. The Parties' Positions

a.

Envisiontec argues that it is entitled to a JMOL as to the jury's finding of infringement

on claim 2 because the evidence at trial does not prove that the accused Vanquish machine (Vanquish) “smooths” uncured material, nor does it show that the Vanquish “contacts” the building material.

First, Envisiontec says that it is impossible for the Vanquish to achieve a smooth level coating because the building material is constantly changing due to the Vanquish’s continuous downward movement. In support, Envisiontec relies on the testimony of Shkolnik, Stucker, and El-Siblani, who testified that the Vanquish continuously moves downward when it is building a part. Envisiontec also cites to the video demonstration, which illustrates the same.

Envisiontec says it is similarly impossible for the Vanquish to smooth uncured material as claim 2 requires because the cooling blade does not traverse the tank to cool the building material after each light exposure. Further, according to Envisiontec, the Vanquish’s curing process occurs at least 200 microns beneath the surface of the uncured material, which means that the building material flows around the object part for the next cure, making smoothing impossible. In support, Envisiontec again cites the video demonstration, along with Shkolnik, Stucker, and El-Siblani’s testimony, and refers specifically to a still screen of the video, which Envisiontec says shows an uneven image of building material.

Finally, Envisiontec says that claim 2 is not infringed because the Vanquish’s winged blade was designed to contact the building material for cooling purposes, not smoothing purposes. In support, Envisiontec cites to the ‘934 Patent description, which sets forth the winged blade design as being “capable of uniform recoating of thin (0.003 to 0.005 in.) layers.” (Doc. 284-5, p. 37). For additional support, Envisiontec reasserts that the

Vanquish operating at 200 microns beneath the uncured material and continuously moving downward, i.e., not able to smooth the building material, proves that the winged blade does not contact the material in such a way as to infringe claim 2.

b.

In response, 3D Systems says that whether the Vanquish machine continuously moves downward, at what depth it operates, or how often the winged blade contacts the material is irrelevant to whether it smooths the uncured material. Further, 3D systems says that sufficient evidence also supports that the winged blade contacts the material. Thus, according to 3D Systems, it was reasonable for the jury to find infringement.

As to the smoothing of the uncured material, 3D Systems relies on the testimony of Shkolnik, who said that the machine contacts the material and that after contact the material is “not wavy.” It also relies on Stucker’s testimony, which described the Vanquish’s “snow plowing” method of removing material during the build process, demonstrated by the video demonstration of the Vanquish in operation, which the jury also viewed. (Doc. 284-10). Next, 3D Systems says that the fact that the machine moves continuously downward is immaterial because the smoothing occurs at the top of the build part and can occur regardless of whether the machine is stationary or continuously moving. Even so, it also disputes Envisiontec’s assertion that all curing takes place at 200 microns below the surface because material hardens when exposed to light, which can only occur if at surface level.

As to the winged blade, 3D Systems says there is sufficient evidence to show that it contacts the building material. In support, 3D Systems cites to the testimony of Shkolnik, Stucker, and the video demonstration, which describe the winged blade making direct

contact with the building material. Thus, 3D Systems says that reasonable minds would have concluded, as the jury did, that the Vanquish infringes claim 2.

C.

3D Systems is correct. Here, the pertinent evidence, which included witness testimony and a video demonstration, was sufficient for the jury to find by a preponderance of the evidence that the Vanquish operates to smooth the material, even if it also acts to cool the material and operates by continuously moving downward and at 200 microns below the building material. Further, the evidence was sufficient to show that the Vanquish's winged blade contacts the building material. Thus, Envisiontec is not entitled to a set aside of the jury's verdict.

#### **V. CONCLUSION**

Accordingly, 3D Systems' JMOL motion is GRANTED as to claim 11 of the '981 Patent. Further, Envisiontec's JMOL motion is DENIED as to claim 2 of the '934 Patent. The Court will enter a second amended judgment consistent with this opinion.

SO ORDERED.

Dated: March 10, 2011

S/Avern Cohn  
AVERN COHN  
UNITED STATES DISTRICT JUDGE

I hereby certify that a copy of the foregoing document was mailed to the attorneys of record on this date, March 10, 2011, by electronic and/or ordinary mail.

S/Julie Owens  
Case Manager, (313) 234-5160